Claims

1. A method of producing a cladding tube for nuclear fuel for a nuclear pressure water reactor, which method comprises the following steps:

formation of a tube which at least principally consists of a cylindrical tube component (1) of a Zr-based alloy, where the alloying element, except for Zr, which has the highest content in the alloy is Nb, wherein the Nb content in weight percent is between 0.5 and 2.4, characterized in that after that the cladding tube has been formed according to the above and after possible rolling steps with heat treatments between them, the cladding tube is finally annealed at a temperature and during a time such that said tube component (1) is partly recrystallized but not completely recrystallized.

2. A method according to claim 1, wherein said final anneal is carried out such that the degree of recrystallization in said tube component (1) is higher than 5% and lower than 95%.

3. A method according to claim 2, wherein said final anneal is carried out such that the degree of recrystallization in said tube component (1) is higher than 40%.

4. A method according to any of the preceding claims, wherein the final anneal is carried out at a temperature which is lower than 550°C.

5. A method according to any of the preceding claims, wherein the final anneal is carried out at a temperature which is between 400°C and 540°C.

6. A method according to any of the preceding claims, wherein the final anneal is carried out during 1h to 6h.

7. A method according to any of the preceding claims, wherein before said final anneal, the method comprises the following steps:

a bar of said Zr-based alloy is formed;

this bar is heated to between 900°C and 1300°C and is thereafter quenched, preferably in water;

a billet is extruded from the bar after heating to between 500°C and 900°C;

the billet is cold rolled to a tube in at least two steps, with heat treatments between them at between 550°C and 650°C.

8. A method according to any of the preceding claims, wherein the Nb content in said alloy is between 0.8 weight percent and 1.2 weight percent.

9. A method according to any of the preceding claims, wherein no alloying element, except for Zr and Nb, in said alloy, has a content which exceeds 0.3 weight percent.

10. A method according to claim 9, wherein said alloy contains between 800ppm and 1700ppm O.

11. A method according to claim 9 or 10, wherein said alloy contains between 50ppm and 600ppm Fe.

12. A method according to any of the preceding claims, wherein said alloy in addition to Zr contains 0.8 weight percent to 1.2 weight percent Nb, 50ppm to 600ppm Fe, 800ppm to 1700ppm O, less than 250ppm C, less than 150ppm Si, less than 1000ppm S and in addition to that only impurities of a content which does not exceed that which is normally accepted in Zr or Zr alloys for applications in nuclear reactors.

13. Use of a cladding tube produced according to the method according to any of the preceding claims in a fuel assembly for a nuclear pressure water reactor.

14. A cladding tube for nuclear fuel for a nuclear pressure water reactor, which cladding tube at least principally consists of a cylindrical tube component (1) of a Zr-based alloy, where the

alloying element which, except for Zr, has the highest content in the alloy is Nb, wherein the Nb content in weight percent is between 0.5 and 2.4, wherein said tube component (1) has been finally annealed such that it has a structure such that it is partly recrystallized but not completely recrystallized.

15. A cladding tube according to claim 14, wherein the degree of recrystallization in said tube component (1) is higher than 5% and lower than 95%.

16. A cladding tube according to claim 15, wherein the degree of recrystallization in said tube component (1) is higher than 40%.

17. A cladding tube according to any of the claims 14-16, wherein the Nb content in said alloy is between 0.8 weight percent and 1.2 weight percent.

18. A cladding tube according to any of the claims 14-17, wherein no alloying element, except for Zr and Nb, in said alloy, has a content which exceeds 0.3 weight percent.

19. A cladding tube according to claim 18, wherein said alloy contains between 800ppm and 1700ppm O.

20. A cladding tube according to claim 18 or 19, wherein said alloy contains between 50ppm and 600ppm Fe.

21. A cladding tube according to any of the claims 14-20, wherein said alloy in addition to Zr contains 0.8 weight percent to 1.2 weight percent Nb, 50ppm to 600ppm Fe, 800ppm to 1700ppm O, less than 250ppm C, less than 150ppm Si, less than 1000ppm S and in addition to that only impurities of a content which does not exceed that which is normally accepted in Zr or Zr alloys for applications in nuclear reactors.

22. A fuel assembly for a nuclear pressure water reactor, comprising:

a plurality of cladding tubes (1) according to any of the claims 14-21 filled with nuclear fuel suitable for such cladding tubes (1) for a nuclear pressure water reactor.

23. A fuel assembly according to claim 22, comprising:

a top plate (4),

a bottom plate (5),

a plurality of guide tubes (3) for control rods, which guide tubes extend between the top plate (4) and the bottom plate (5), and

a plurality of spacers (2) arranged for maintaining said cladding tubes (1) in position in the fuel assembly and at suitable distances from each other.